Kemler MA, de Vet HC, et al. Effect of spinal cord stimulation for chronic complex regional pain syndrome Type I: five-year final follow-up of patients in a randomized controlled trial. J Neurosurg 2008;108:292-298

Design: Randomized clinical trial

Population/sample size/setting:

- 44 patients in the Netherlands with CRPS-I who completed 5 years of follow-up in a randomized trial of spinal cord stimulation plus physical therapy (SCS+PT) versus PT alone
- Inclusion was based upon IASP criteria for CRPS (noxious initiating event, allodynia/hyperalgesia, edema/sudomotor/blood flow changes), pain score at least 5 on VAS from 0 to 10, confined to extremity but affecting the entire hand or foot, lasting at least 6 months, but not responding to PT, sympathetic blocks, medication, or TENS
- Exclusion criteria included Raynaud's disease, neurological abnormalities unrelated to CRPS, coagulation abnormalities, cardiac pacemaker use, and a score of 200 or more on the Symptom Check List-90, a standardized psychological test
- Original trial randomized 54 patients who had been randomized to either SCS plus standardized physical therapy (SCS+PT, n=36) or to PT alone (N=18)
- Of the 10 patients who were not analyzed in the 5 year follow-up, 5 had been randomized to SCS (4 lost to follow-up and 1 for technical reasons); 5 had been randomized to PT (4 later received SCS and 1 was lost to follow-up)
- The 5 year follow-up compared 31 SCS patients with 13 PT patients
- The primary outcome measure was the reduction from baseline in pain intensity as measured on a VAS from 0-10

Main outcome measures

- Of the 36 patients originally randomized to SCS, 24 had positive trials and were implanted with permanent stimulation systems, and 22 of these participated in the 5 year follow-up
- 12 patients randomized to SCS had negative screening trials and crossed over to PT; 9 of these participated in the 5 year follow-up, and were analyzed as SCS participants (i.e., the 5 year analysis is by intention to treat)
- 13 of the 18 participants randomized to PT were in the 5 year follow-up; the remaining 5 were excluded (4 who had crossed over to SCS and 1 who was lost to follow-up); therefore, these 13 were analyzed as treated on PT
- In the main analysis, the mean reduction in pain intensity at 5 years was 1.7 in the SCS group and 1.0 in the PT group (p=0.25); this was similar to the scores observed at 3 and 4 years of follow-up
- A 7 point global perceived effect scale (1=much worse, 7=best ever) was also compared between groups; no difference trend was observed between groups
- Health-related quality of life measures also did not differ between groups

- Additional analyses which included the patients who had been excluded from the main analyses did not reveal significant differences between SCS and PT on either the principal or secondary outcomes
- Complications of SCS occurred mainly in the first 2 years after implantation of the system; the pulse generators had to be replaced in 17 of the 24 patients in the SCS group who received them, and the mean battery life is about 4 years

Authors' conclusions:

- Pain-alleviating effect of SCS in patients with CRPS diminishes over time, and is no longer significant compared to PT after 3 years
- The disappearance of the early advantage of SCS over PT may arise from both a loss of effect of SCS over time and a spontaneous improvement in the PT group over the same time period
- Even though the 5 year follow-up data for SCS do not show a sustained analgesic effect, SCS is still worth performing, since
    - 18 of 20 patients with an implanted SCS at the final follow-up reported a positive benefit, and 19 would have the procedure again
    - Pain reduction for 2-3 years in a chronic pain patient population is an important achievement

Comments:

- Basics of control of bias were adequately done: randomization with allocation of concealment, and intention-to-treat analysis of results
- Figure 3 visually appears to show more patients in SCS group than in PT group having improvement, but more SCS patients also were reported as much worse in the global perceived effect; the chi square for trend (done on SPSS software) has a p value of 0.237, indicating no relationship between treatment group and perceived effect
- If the patient satisfaction data are accurate, it would appear that almost all of the 11 SCS patients in Fig. 3 whose global perceived effect was "worse, much worse, or worst ever" were satisfied and would have the procedure again, making the "positive benefit" data problematic to interpret
- It is possible that many of the "satisfied" patients were basing their reporting that they would repeat the procedure on pain relief obtained during the first two or three years after the operation, and not on their final status
- PT in the original study consisted of graded exercises 30 minutes twice per week for 6 months; at 2 years, 21 patients (9 SCS+PT, 12 PT) were still receiving PT, but participation beyond 2 years was not reported in this study

Assessment: Adequate for evidence that SCS may be beneficial for CRPS for up to 3 years, but that benefits beyond that time are likely to decrease